

a reaction surface configured to provide an interaction site for said packets;
an inlet port coupled to said reaction surface and configured to introduce said packets onto said reaction surface;
means for generating programmable manipulation forces upon said packets, said forces capable of programmably moving said packets about said reaction surface along arbitrarily chosen paths;
a position sensor coupled to said reaction surface and configured to track positions of individual packets on said reaction surface; and
a controller coupled to said means for generating programmable manipulation forces and to said position sensor, said controller configured to adjust said programmable manipulation forces according to said positions so that said packets move along said arbitrarily chosen paths.

2. (Amended) The apparatus of claim 1, further comprising an outlet port coupled to said reaction surface and configured to collect said packets from said reaction surface.

3. (Amended) The apparatus of claim 1, wherein said means for generating manipulation forces comprises a conductor adapted to generate an electric field.

4. (Amended) The apparatus of claim 1, wherein said means for generating manipulation forces comprises a light source.

5. (Amended) The apparatus of claim 1, wherein said manipulation forces comprise a dielectrophoretic force, an electrophoretic force, an optical force, a mechanical force, or any combination thereof.

6. (Amended) The apparatus of claim 1, wherein said position sensor comprises a plurality of conductors configured to measure an electrical impedance of said packets.

7. (Amended) The apparatus of claim 1, wherein said position sensor comprises an optical system configured to monitor said positions of individual packets.

Cont
A2

8. (Amended) The apparatus of claim 1, wherein said means for generating programmable manipulation forces and said position sensor are integral.

20. (Amended) A method for manipulating a plurality of packets, comprising:

providing a reaction surface, an inlet port coupled to said reaction surface, means for generating programmable manipulation forces upon said packets, a position sensor coupled to said reaction surface, and a controller coupled to said means for generating programmable manipulation forces and to said position sensor;
introducing one or more materials onto said reaction surface with said inlet port;
compartmentalizing said one or more materials to form said packets;
tracking positions of individual packets with said position sensor;
applying programmable manipulation forces on one or more of said packets with said means for generating programmable manipulation forces, said programmable manipulation forces being adjustable according to said positions by said controller; and
programmably moving one or more of said packets according to said programmable manipulation forces along arbitrarily chosen paths.

21. (Amended) The method of claim 20, wherein said packets comprise a fluid packet, an encapsulated packet, or a solid packet.

22. (Amended) The method of claim 20, wherein said compartmentalizing comprises suspending material in a partitioning medium.

24. (Amended) The method of claim 22, wherein said reaction surface includes a coating, and the hydrophobicity of said coating is greater than the hydrophobicity of said partitioning medium.

25. (Amended) The method of claim 20, wherein said applying programmable manipulation forces comprises applying a driving signal to one or more driving electrodes arranged in an array to generate said programmable manipulation forces.

26. (Amended) The method of claim 20, wherein said programmable manipulation forces comprise a dielectrophoretic force, an electrophoretic force, an optical force, a mechanical force, or any combination thereof.

27. (Amended) The method of claim 20, wherein said sensing comprises applying a sensing signal to one or more impedance sensing electrodes arranged in an array to detect impedances associated with said packets.

28. (Amended) The method of claim 20, further comprising interacting one or more of said packets, wherein said interacting comprises moving, fusing, merging, mixing, reacting, metering, dividing, splitting, sensing, collecting, or any combination thereof.

REMARKS

The active claims in this case are claims 1-8 and 20-28. Favorable consideration is respectfully requested.

Applicants respectfully submit that the subject matter of claims 1-8 and 20-28 is patentable for at least the reasons set forth during prosecution of the parent application, Serial No. 09/249,955. There, it was explained that cited art did not disclose, teach or suggest programmable movement along arbitrarily chosen paths or tracking individual packet positions for motion along arbitrarily chosen paths. In particular, Applicants presented the following type of arguments during prosecution of the parent case, which resulted in a notice of allowance.

1. Arbitrarily Chosen Paths

Independent claims 1 and 20 recite that packets may be programmably moved about the reaction surface *along arbitrarily chosen paths*. These features allow the present invention to